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A Conceptual look at Hodgkin's disease

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A CONCEPTUAL LOOK AT HODGKIN'S DISEASE

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Over the course of compiling this body of work there has been one main contributing factor. She has made endless sacrifices on my behalf. Her good works number the stars in the sky. It is to her I reserve my greatest thanks. Sagapo, Angela.

I dedicate this thesis to my father, whose devotion to his studied occupation interested me in pursuing a career in applied medicine.

INTRODUCTION

The decision to spend the past eight months studying Hodgkin's Disease was one slow in coming. When confronted with the subject I remember questioning the logic of investing so much time in something I knew so little about. Like other decisions of the past, I resigned to basic study to see if this was really what I wanted to do. The study proved to be somewhat confusing. I knew no one with Hodgkin's disease nor did I know anyone who had ever had it, in fact I'd only heard it referred to in a movie. The challenge was set. I liked that most of all; to tackle a topic I was completely oblivious to.

I sit here eight months later on the eve of my Thesis show opening, pondering that decision I committed myself to. In that time spent I have discovered so many things. To skim the surface, I now know the basics of Hodgkin's disease, its staging and treatments. I am more aware of the Lymphatic System and its purpose in the body. I am at the genesis of the complexities faced daily by the physician and the patient in terms of this disease. All this is well and good for the intellectual and will indeed serve me for the rest of my life. However, the greatest possession of value I have gained is the humbling association with those afflicted and those dedicated to serve. It is them that I salute as modern day heroes, and it is to them that I give great thanks.
You have touched me, I have grown.

" The ape was staggered, and what with the mortal wound in his side had almost collapsed, when, with one mighty effort he rallied for an instant--just long enough to enable him to wrest his arm free from Tarzan's grasp and close in a terrific clinch with his wiry opponent.

Straining the ape-man close to him, his great jaws sought Tarzan's throat, but the lord's sinewy fingers were at Kerchak's own before the cruel fangs could close on the sleek brown skin.

Thus they struggled, the one to crush out his opponent's life with those awful teeth, the other to close forever the windpipe beneath his strong grasp while he held the snarling mouth from him.

The greater strength of the ape was slowly prevailing, and the teeth of the straining beast were scarce an inch from Tarzan's throat when, with a shuddering tremor, the great body stiffened for an instant and then sank limply to the ground.

Kerchak was dead.

Withdrawing the knife that had so often rendered him master of far mightier muscles than his own, Tarzan of the Apes placed his foot upon the neck of his vanquished enemy, and once again, loud through the forest rang the fierce, wild cry of the conqueror.

And thus came the young Lord Greystoke into the kingship of the Apes."1

As a boy, I had difficulty reading. My parents tried in vain to encourage my reading. It was all for naught. Until one day, on a family outing, my mother produced several books for us as children to read. She handed me Edgar Rice Burrough's, *Tarzan Of The Apes*. The cover was illustrated by Neil Adams and was the winning motivator. For practically the first time in my life, I read a book from cover to cover. Though I didn't understand all the words, I loved the story and the story's main character. This led to other books and an interest in current illustrators. As a budding artist, my art often reflected the heroic scenes. I tried to emulate the wonderful covers, with their muscle-bound characters. I drew, like most young boys, from an onslaught of comic books. Little did my mother know the monster she unleashed.

It has been almost twenty years since that first book. It is worn and ragged. The comics have all been tossed out and the fanciful stories of youth have been replaced by the hard realities of life.

1. Burroughs, Edgar Rice, *Tarzan of the Apes*, pp. 86&87.

Yet I still see images of a younger day creep into the pages of my sketchbooks.

I never lost my love for the human form. I suppose this led to my decision to study Medical Illustration. To complete the story, bodybuilding was a tremendous asset and constant motivator. I took great joy in the development, strength and discipline it provided.

All the steps were there for an interest in some sort of anatomical career. Pride, as usual, reared its nasty head and I fell victim to our social system. Not thinking *Art* was a worthy profession, I set my sights on Medicine, then Engineering, then Aerospace Engineering. I even considered a job in the entertainment field. Always Art was calling me. Finally, I enrolled in two art courses at the University of Idaho (chosen for its fine Engineering school) and three years later graduated with a Bachelor of Fine Arts degree.

In the pursuit of continuing education, I applied to several heavyweight schools for entrance into a painting MFA. However, after visiting one of the so-called Ivy League schools, I was much dismayed and went back to the drawingboard. After another run through school listings, my interest was caught by the field of Medical Illustration, a field I knew little to nothing about.

Coming to Rochester to study Medical Illustration was the culmination of a positive chain of events. I feel our lives are guided and sparked by those things which make us happy. It has taken me many years, but if I listen to the voice inside it's usually right and will carry me to my next destination.

The Rochester Institute of Technology was the first to introduce me to several media that I had never been exposed to before. In preparation for my thesis, I wanted to incorporate as many of these new found media as I could. I had also gained a large and broad interest in my science studies. I knew that my thesis should also reflect that interest.

The decision to study Hodgkin's disease was first presented to me by my father, an Otolaryngologist, in Cheyenne, Wyoming. I inquired as to what he thought would be an interesting course to take and was thus introduced to Hodgkin's disease. He felt it would lend itself to a multitude of ideas. This has indeed proven true.

I knew nothing of Hodgkin's disease. I had no encounters on a personal or even an

acquaintance level. To me, it was as foreign as a solar system across the galaxy. I spent time last summer in the University of Rochester Medical Library scraping together Hodgkin's information and trying to make some kind of sense out of it all. After I felt I had a basic understanding, I sought the council of my thesis committee. They were very helpful, providing me with leads for pursuing this project.

Hodgkin's disease is a complex disease attacking a multitude of areas or sites in the human body. With my thesis presentation I wanted, in a series of panels, to take the viewer on a voyage of discovery. Much like my own discovery, I wanted to guide the viewer's interest. This would include a vivid introduction piece of Hodgkin's disease. The following work would show normal vs. abnormal lymph nodes with pictorial and written description. Staging, the process of classifying the disease for treatment, would also be included. In conclusion, a set of graphs would be used to depict modern treatment techniques for combatting Hodgkin's disease to illustrate hope and the success of treatment. I wanted the viewer to feel uplifted, educated, and more aware of Hodgkin's disease after their experience through my panels.

HODGKIN'S DISEASE

The History

Thomas Hodgkin was a scholar dedicated to the careful correlation of clinical medicine and morbid anatomy in the delineation of disease.1 He was a skillful physician and dedicated student; he learned the medicine of his time.2 He was a century ahead of his time with respect to his interest in the social aspects of medicine and, in particular, to the medical problems associated with poverty, and underprivileged groups such as the American Indian and the African native. A complete bibliography of Hodgkin's writings, reflect the eclectic spectrum of his interest.

Hodgkin's historic paper entitled "On Some Morbid Appearances of the Absorbent Glands and

1. Kaplan, *Hodgkin's Disease*, pp. 1-4.
2. Hellman, *Thomas Hodgkin and Hodgkin's Disease*, JAMA, pp. 1007.

Spleen," was read before the Medical-Chirurgical Society on January 10th and 24th, 1832. Hodgkin's characteristic modesty emerges in the very first paragraph: "The morbid alterations of structure which I am about to describe are probably familiar to many practical morbid anatomists, since they can scarcely have failed to have fallen under their observation in the course of cadaveric inspection. They have not, as far as I am aware, been made the subject of special attention, on which account I am induced to bring forward a few cases in which they have occurred to myself, trusting that I shall at least escape severe or general censure, even though a sentence or two should be produced from some existing work, couched in such concise but expressive language, as to render needless the longer details with which I shall trespass on the time of my hearers."3

He was probably correct in believing that others had observed the same condition. In his paper, Hodgkin briefly described the clinical histories and gross postmortem findings on six cases (only three of which were actually believed to have had Hodgkin's disease). [This was a remarkable finding, considering that his observation was based purely on gross morphology, unaided by microscope.] He was aware that the patient in his case 1 had a history of exposure to tuberculosis and had evidence of tuberculosis at autopsy; he was also aware that his patient in case 3 had a history of syphilis treated with mercurials. Yet he included these with the others, suggesting that he believed them to be valid examples of what was later designated as *Hodgkin's disease.*

Others were making similar discoveries at and around the same time. In 1838, Richard Bright, principal consulting physician at Guy's Hospital in London, England, reprinted Hodgkin's cases 1 and 2 noting: "There is another form of disease, which appears to be a malignant character, though it varies from the more usual forms of malignant disease; and which has been particularly pointed out by Dr. Hodgkin, as connected with extensive disease of the absorbent glands, more particularly those which accompany the blood vessels." Dr. Samuel Wilks continued this discussion in his paper, "Lardaceous disease"(1856). " The affection of the lymphatic glands appear to bear a significant relationship to this form of disease." 4

3. Kaplan, *Hodgkin's Disease,* pp. 4-7.

4. Kaplan, *Hodgkin's Disease,* pp. 7-9.

Had it not been for the magnanimous and selfless character of Sir Samuel Wilks, Hodgkin's disease might now be called Wilk's disease. Due to parallel studies and the lack of wide spread current printed material, names were often overlooked. Dr. Wilks finally gave the disease its current name in his paper, "Enlargement of the Lymphatic Glands and Spleen" subtitled "Hodgkin's disease" (1865). He gave this statement: "While writing this paper, I endeavored to find the observations of Dr. Hodgkin on a peculiar enlargement of the lymphatic glands. I was referred to this by Dr. Bright. I there discovered that one or two of the cases had already been published by Dr. Hodgkin. Including this disease with a peculiar affection of the spleen. I would have used this with respect to any originality of observation on my part, but could do no better than refer to these cases, which resemble so exactly those which come under my own notice. It is only to be lamented the Dr. Hodgkin did not affix a distinct name to the disease, for by so doing I should not have experienced so long an ignorance of a very remarkable class of cases."

He continues: "I refer to a disease where the lymphatic glands are increased in size, and associated with a deposit of a morbid kind in the internal viscera, more especially in the spleen. Although my own observations were at the time original, I had been forestalled by Dr. Hodgkin, who was the first, as far as I am aware, to call attention to this peculiar form of disease."5

This concludes the abbreviated chronology of the various studied members of this *lymphoma*. Let us now consider the concepts concerning its pathogenesis. Dr. Wilks actually used the microscope to study some of his cases, but his descriptions were confined to brief statements, such as "the microscope showed masses of cells and fibers of the new tissue."6 It remained for Langhans (1872) and Greenfield (1878) to describe the histopathologic features of the disease.

Histopathology of Hodgkin's Disease

Langhans clearly recognized the presence of giant cells within Hodgkin's biopsied lymph nodes. They contained 2-4 or more nuclei and somewhat dense, granular cytoplasm,with an elongated shape. Greenfield referred to the same as "multinucleated cells, containing from four to eight to

5. Kaplan, *Hodgkin's Disease*, pp. 9&10.

6. Kaplan, *Hodgkin's Disease*, p. 11.

twelve nuclei" and submitted drawing of such cells, seen at low magnification in a lymph node. However, Sternberg(1898) and Dorothy Reed(1902) are generally credited with the first definitive and thorough descriptions of the histopathology of Hodgkin's disease. Reed clearly illustrated the appearance to the multinucleated giant cells with excellent drawings. On the basis of her studies, Reed was able to conclude: "We believe then, from the descriptions in the literature and the findings in eight cases examined, the Hodgkin's disease has a peculiar and typical histological picture and could thus rightly be considered a histopathological disease entity."[7] The name currently given to the multinucleated giant cell is the Reed-Sternberg cell.

With the aid of modern histological advances, we know that the Reed-Sternberg cells are large cells with eosinophilic cytoplasm and and often a perinuclear halo. The nuclear morphology is striking with a large eosinophilic inclusion-like nucleolus, a thick, well-defined nuclear membrane, and pale-staining chromatin. Although Reed-Sternberg cells classically have two mirror-image nuclei, they frequently contain more than two, and there is often prominent nuclear lobation. It is essential to identify Reed-Sternberg cells in order to make a diagnosis of Hodgkin's disease.[8]

The Disease

Hodgkin's disease is a malignant neoplasm of the lymphatic structures. It involves primarily the lymphoid tissues. Arising almost invariably in a single node or chain of nodes, Hodgkin's diseases spreads characteristically to the anatomically contiguous nodes.[9] This is a type of *lymphoma*. Lymphomas are cancers that develop in the *lymphatic system*, part of the body's circulatory system. The job of the lymphatic system is to help fight disease and infection.

The lymphatic system is made up of a network of thin tubes that branch, like blood vessels, into all the tissues of the body. Lymphatic vessels carry lymph, a colorless, watery fluid that contains infection-fighting cells called *lymphocytes*. Along this network of vessels are groups of small, bean-shaped organs called *lymph nodes* that filter the lymph fluid as it passes through the nodes.

7. Kaplan, *Hodgkin's Disease*, pp. 11-13.

8. Selby / McElwain, *Hodgkin's Disease*, pp. 4&5.

9. Cotran, Kumar, Robbins, *Robbins Pathologic Basis of Disease*, pp. 717-719.

Clusters of lymph nodes are found in the underarm, groin, neck, and abdomen.

Other parts of the lymphatic system are the spleen, thymus gland, tonsils, and bone marrow. Like other types of cancer, Hodgkin's disease affects the body's cells. Healthy cells grow, divide, and replace themselves in an orderly manner. This process keeps the body in good repair. In Hodgkin's disease, painless and progressive enlargement of the lymphoid tissue, usually a single node or group of nodes cells in the lymphatic system, begin growing abnormally and if left untreated, spread to other organs. These cells can form cohesive masses of tissue that infiltrate and replace normal structures, as do other tumors. The lymph nodes are the most frequently involved structures, particularly in the cervical region. There is also a tendency for different types of Hodgkin's disease to localize to different nodal groups; mediastinal nodes are commonly infiltrated in advanced staging.

As the disease progresses, the number of normal lymphocytes is reduced--leaving the body fewer cells to fight infection. In the early course of the disease, splenic enlargement usually occurs with liver, lungs, digestive tract, and bone marrow sure to follow. The malignant proliferating cells may invade almost any area of the body and may produce a wide variety of symptoms. Low-grade fever, night sweats, weight loss, fatigue, and anemia are indicative of disease spread.

As the disease progresses, the rapid proliferation of abnormal lymphocytes leads to an immunologic defect, particularly in cell-mediated responses, rendering the person more susceptible to bacterial, viral, fungal, and protozoal infections.10

The Lymphatic System

The terms lymphatic and lymphoid are used to identify or define the tissues or organs of the body where lymphocytes, the main functional cell, are the chief cellular constituent. Often this same system is referred to as the immune system. These are gross anatomical terms used to identify the portion of the circulatory system that collects and drains lymph from various tissues of

10. *What You Need To Know About Hodgkin's Disease*, NCI Publication, pp. 2&3.

the body. It is important to note that lymphocytes and other cells responsible for immune responses are distributed throughout the connective and epithelial tissues of the body. There are basically two types of lymphocytes: *T-lymphocytes*, which have a long life-span and are involved in cell-mediated immunity and *B-lymphocytes*, which have variable life-spans and are involved in the production of antibodies. This introduces the two pathways the immune system uses to combat antigens; cell-mediated response, leading to cell-mediated immunity, and humoral response, leading to antibody-mediated immunity. The lymphatic system is responsible for acquired immunity, that is, the body's ability to resist the effects of disease-producing organisms or their toxins.11

Lymph nodes are small, bean-shaped encapsulated lymphatic organs. They serve as filters through which lymph percolates on its way to the blood. Lymph enters the node through *afferent lymphatic vessels*, is filtered, and leaves through *efferent lymphatic vessels*. The node is surrounded by a capsule of dense connective tissue. Within the capsule is a framework of reticular tissue made up of reticular cells. This meshwork acts as a supporting and filtering system

The parenchyma of the lymph node is divided into cortex, the outer portion, and medulla, the inner part. The cortex is divided by its subcapsular sinuses, the lymph sinuses just under the capsule, and trabecular sinuses that extend throughout the cortex. The cortex also houses the germinal center which contains, among others things, large lymphocytes, plasma cells and macrophages. The medulla is separated by lymph sinuses, called medullary sinuses. Lymph is monitored as it percolates through the sinuses.12

It is in the cortex that the Reed-Sternberg cell will be found if the host is afflicted with Hodgkin's disease.

If Hodgkin's disease is suspected, a series of tests will be conducted by the patient's doctor. These tests will include a complete physical exam, blood test and x-rays of the chest, bones, liver,

11. Ross / Romrell, *Histology*, pp. 307-338.

12. Kessel / Kardon, *Tissues and Organs*, pp. 51-59.

and spleen. Tissue from an enlarged lymph node will be removed. This is called a *biopsy.* The tissue will then be sent to a pathologist who will examine it under a microscope. He will be looking for a multinucleated giant cell, the Reed-Sternberg cell. Once the presence of this cell has been discovered, another series of tests will be used to establish the stage, or extent of the disease. Knowing the stage is very important for planning the treatment of the patient. The stage indicates where the disease has spread and how much tissue is affected.[13]

Staging

Staging plays a critical role in the selection of Hodgkin's treatment. The stage is based on a combination of clinical staging (patient history, physical exams, x-rays and laboratory studies) and pathological staging (biopsies of lymph nodes, liver, bone marrow, etc...). The classification of Hodgkin's disease is widely agreed upon and fairly straightforward. The system in almost universal use is based on that of Lukes and Butler, which was modified at the Rye Conference of 1966. It has since become known as the Rye classification. However, in 1971 this classification was condensed and adopted at the Ann Arbor Conference. Both names are still used interchangeably. Each classification has a number of subclassifications, for the sake of the reader and for simplification on this level I will use the classification provided by the National Cancer Institutes PDQ treatment information.

STAGE I Stage I Hodgkin's disease means that cancer is limited to one group of lymph nodes in one limited area of the body, or in one organ in one site.

STAGE II Stage II Hodgkin's disease means that the cancer involves more than one group of lymph nodes or localized involvement of an extralymphatic organ, but is entirely above or entirely below the diaphragm.

13. *What You Need to Know About Hodgkin's Disease,* NCI Publication, pp. 3&4.

STAGE III Stage III Hodgkin's disease means that the cancer involves lymph node groups above and below the diaphragm, may or may not involve the spleen, which is considered part of the lymphatic system, and may or may not involve extralymphatic organs or sites.

STAGE IV Stage IV Hodgkin's disease means that the cancer has disseminated to organs in addition to the lymph nodes. Organs that may be involved include the liver, lung, bone and bone marrow.14

Treatment

Treatment for Hodgkin's disease usually includes *radiation therapy* or *chemotherapy.* Sometimes, both are given. Treatment decisions are made depending on the stage of the disease, its location in the body, which symptoms are present, and the general health and age of the patient.

For early stages of Hodgkin's disease, radiation therapy is usually used. **Radiation therapy** uses high-energy rays to convert water ions in the cell to *free radicals*. Aggressive free radicals strike DNA molecular chains, disrupting specifically the linkage and bonds within the molecule. This inhibits proper cell division and could lead to cell death. Radiation is given to the patient, in a hospital or clinic, 5 days a week for several weeks. Weekend rest periods allow time for healthy cells to repair themselves.15

Chemotherapy is used in more advanced stages of Hodgkin's disease. Chemotherapy is the use of drugs to kill cancer cells. The drugs may be given in different ways: Some are given by mouth; others are injected into an artery, vein, or muscle. The drugs travel through the

14. *Adult Hodgkin's Disease,* NCI -PDQ Treatment information.

15. Cotran, Kumar and Robbins, *Robbins Pathologic Basis of Disease,* pp. 504-511.

bloodstream to almost every part of the body. Upon reaching the cell, the chemicals that make up chemotherapy form bridges between target sites resulting in cross linking of DNA strands. Linking between DNA and orbiting nucleoproteins can also take place. This results in abnormal cell division, which subsequently leads to cell death. Chemotherapy is usually given in cycles, a treatment period followed by a rest period, then another treatment period, and so on.16

Treatment by Stage:

Stage I Hodgkin's disease is highly curable. Standard treatment consists mainly of radiation therapy. In more serious Stage I, the combination of chemotherapy and radiotherapy are used.

Stage II Hodgkin's disease is also highly curable. Standard treatment consists of radiation therapy alone, chemotherapy alone or the combination of the two. This is dependent on the tumor volume and the site of the involvement.

Stage III Hodgkin's disease is usually curable. Treatment consists of combination chemotherapy with radiation therapy to bulky sites of the involvement, chemotherapy alone or radiation therapy alone.

Stage IV Hodgkin's disease is usually curable. Treatment consists of combination chemotherapy with radiation therapy to areas of bulky disease, combination chemotherapy alone or bone marrow transplants.17

The methods used to treat Hodgkin's disease are very powerful. That is why the treatment often causes side effects. These side effects can be both short-term and permanent. The side effects depend on the type of treatment and on the body being treated. During radiation therapy the patient may become unusually tired as therapy continues. Skin could become red and dry. When the chest is treated the patient may have a sore throat or trouble swallowing. Sometimes even shortness of breath. Treatment to the lower abdomen may cause nausea, vomiting, or diarrhea. These side effects usually disappear when treatment has ended.

Chemotherapy side effects depend on the drugs being given and the individual response of the

16. Kalant / Roschlau, *Principles of Medical Pharmacology,* pp. 604-613.

17. *Adult Hodgkin's Disease,* NCI -PDQ Treatment Information.

patient. Chemotherapy commonly effects fast reproducing cells such as those of the hair and digestive tract. This treatment can also have some effect on blood-forming cells. As a result, patients may experience hair loss, lowered resistance to infection, loss of appetite, nausea and vomiting, and mouth sores. These side effect usually end after treatment is finished.[18]

Prognosis

Thirty years ago, few patients with Hodgkin's disease recovered from their illness. Now, because of modern radiation therapy and combination chemotherapy, more than 75 percent of all newly diagnosed Hodgkin's disease patients are curable. The chances for recovery continue to improve as scientists find new and more effective treatments. Statistics are compiled often and supplied through the National Cancer Institute (NCI) in Bethesda, Maryland. The office for assimilating this information is called PDQ. This database helps keep doctors and patients informed and updated on information concerning all types of cancers.

Statistics are an average based on the experience of large numbers of people, and no two cancer patients are alike. In putting together my statistic information, I used current information supplied by a local Oncologist and NCI's PDQ. The results were very encouraging. It is important to remember that cancer information has become much more accurate over the past years. What may have been considered one disease one hundred years ago may be completely different today. The current Hodgkin's statistics are only accurate up to twenty years. Even though many patients recover completely, doctors use the term "remission" rather than "cure". This is because Hodgkin's disease can show up again at a later time or the patient might survive their bout with Hodgkin's disease but die of complication from treatments or other fatal causes.

Of the information I gathered, males were more likely to become afflicted with Hodgkin's disease. Both sexes consistently peak at the ages of 19yrs.to 30yrs. and later from 65yrs.to 75yrs.

Of the advanced Hodgkin's disease, male and female, patients treated with MOPP (Mechorethamine, Vincristine, Procarbazine, Prednisone), chemotherapy, 63.1% remained in

18. *What You Need to Know About Hodgkin's Disease*, NCI Publication

remission over a twenty year time. The greatest decline or relapse occurred in the first five to six years after initial treatment ended.

Of the advanced Hodgkin's disease, male and female, patients treated with radiation therapy 93% survived over a ten year time line with 76% remaining relapse-free. Again, the greatest decline occurred in the first six years after the termination of radiation therapy.

The combination of chemotherapy and radiation therapy is applied with great skill and caution by the physician. If the patient can be treated by one or the other alone, that would be the course recommended. This combination, though successful, is dangerous. Of the patients, male and female, with advanced Hodgkin's disease, 83% remained in remission over a one hundred month period.19

The cause of Hodgkin's disease is unknown. There is a longstanding suspicion that the disease may begin as an inflammatory reaction to an infectious agent. There also seems to be an association between the presence of the disease and a deficient immune state. As with other forms of cancer, it is likely that no single agent is responsible for the development of Hodgkin's disease.

Only recently there have been hypotheses suggesting that there is an infectious agent to which there is an exuberant immune proliferative response that eventually gives rise to the emergence of the clone of malignant cells involved in the prolonged and protracted reaction. This malignancy has been thought to be of B-cell, T-cell, histiocytic, or other cell origin and only now, using monoclonal antibody techniques, is it being elucidated.20

THE ART WORK

I remember watching her as she eased her brush through the mush of cerulean blue. The paint mixed with the oil-turpentine mixture. She raised the brush to the virgin canvas and lightly, ever so lightly, began the under painting. I marveled at the grace her trained hand laid the foundation. As the thin blue streaks pigmented the white, I lost track of all time. Minutes merged with hours.

19. Selby / McElwain, *Hodgkin's Disease*, pp.181-299

20. Hellman, *Thomas Hodgkin and Hodgkin's Disease*, p.1008.

The afternoon drifted away.

My grandmother inspired my eager ambition. The summers spent with her and Grandpa in the old honey house delight my memories. For the longest time I confused the sweet smell of honey and hot wax with that of the artist medium. To this day when I mix my medium, I judge its consistency on how close its smell reminds me of those days.

An artist doesn't begin his artistic career with a Thesis show. Many things must have been laid as a foundation for the resulting work. Many people have been instrumental in guiding my pathway. To those, I salute in reverence and humility.

I hungered to paint, so, at eleven I requested an oil starter kit for a birthday gift. The space age had hypnotically lured me into its enticing grasp so it was only logical to paint a depiction of the lunar missions. Upon completion, pride pushed me through seven years of oil training. As my hand-eye coordination improved so did my skill as a painter. Once in high school, I was encouraged to observe the masters, their styles and techniques.

Friendships were formed. Jeff, Wayne, Stewart and myself. We were art and art was us. Together we discussed art's logic, its history and its relative context to our lives. We pushed each other to greater heights. If one had ideas or skills he introduced them to the others. Thus the reciprocation completed its cycle. *Els Quatre Gats* of Cheyenne dominated the high school art awards for two years.

The crash came.

High school ended, the friends departed in their quest for life and its many enticements. Jeff worked for Disney out in California and later for Marvel. Wayne got his Associates degree from the Denver Art Institute and landed an Art Director's job in Minneapolis, St. Paul. He's done well winning three Clio awards in Advertising. Stewart, joined the Air Force and, the last I heard, was somewhere in Germany. Me? My spark just plain went out.

For years my hand never touched a paint brush. Hell, I was married for three years before my wife even knew I could paint. It takes a long time to come back. That same pride that fueled the fire before was devastatingly cruel as I tried to relearn the skills of the past. I wouldn't surrender

to the demon of defeat. I wanted the magic. To me art is greater than man. It is a miracle of God and I believe there is magic there. The rewards came back.

After the decision was made and my proposal was in, I began to formulate a plan as to how best to attack the subject of Hodgkin's disease. My thesis proposal stated that I wanted to illustrate five panels which simply explained Hodgkin's disease to the lay-public. Research was a good start but I needed "hands on" interaction with the topic. I was advised to go to the source, so I made a visit to the office of an Oncologist (one who studies tumors). It was there that I first formulated plans as to the presentation of the thesis work.

Hodgkin's disease
Oil on canvas
24" x 30"

I wanted an introduction piece that grabbed the viewer, pulling them in with interest and intrigue. It was important for the viewer to see a visual depiction of Hodgkin's disease and the sites of the body where it could be found. In my research I found an old illustration done in water color by Robert Carswell (1793-1857). Depicted in the illustration was a patient seen by him at postmortem examination. It showed an individual affected by a number of malignant tumors. This gave me the idea.

I persuaded the anatomy lab at the University of Rochester to allow me to dissect a cadaver for the purpose of locating lymph node sites and their surrounding anatomy. After a thorough dissection of the upper right quadrant and brachial plexus, I composed a series of sketches to be used for the final painting.

I was taught by the old school of painting to build and stretch your own canvas. This connects you with the work and stimulates its success. I was careful in my color choice. Experimenting with a variety of colored pencils, I achieved the colors I desired, burnt umber, burnt sienna, raw sienna, yellow ochre, and alizarin crimson. Together, I combined the colors into a thin wash and delicately stained my gessoed canvas. I allowed the color to soak into the fabric then, with a short bristled brush, flicked alizarin speckles across the light ebauche. The drying took several hours so with the allotted time, I finalized my cadaver sketches on a large 18"x 20" newsprint sheet. Mounting the finalized drawing next to my easel, I was set to begin production.

I have a very formal way of painting. I lay my paint across a glass pallet which neutralizes the oil colors with its masonite brown under-board. The colors are arranged from warmest to coolest. The earth browns cluster south of the warmer tones.

The ecorche was then sketched freehand on the prepared canvas with light charcoal. The purpose for using charcoal stems from the ancient Greeks. Charcoal is compressed dust and, therefore, easily removed once mixed with paint. This leaves little to no trace of preliminary drawings and makes for a cleaner surface.

An imprimatura (underpainting) is created. I paint this imprimatura making bold separations of chiaroscuro, between light and dark, using yellow ochre and raw sienna as the primary separators. I use the large (6, 8, 12) Edgar Degas, filberts for large rounded areas and the smaller (2, 3, 4) Gainsborough, flats for those hard to reach places. This is a process of placing the right colors in their appropriate place. I blend this layer with a #12 Windsor Newton,water color, blending brush and set the canvas aside to dry. I started using red sable brushes, to blend, more by accident than by calculation. There is an old taboo associating the use of certain brushes for certain media. I don't buy it. If it works, use it.

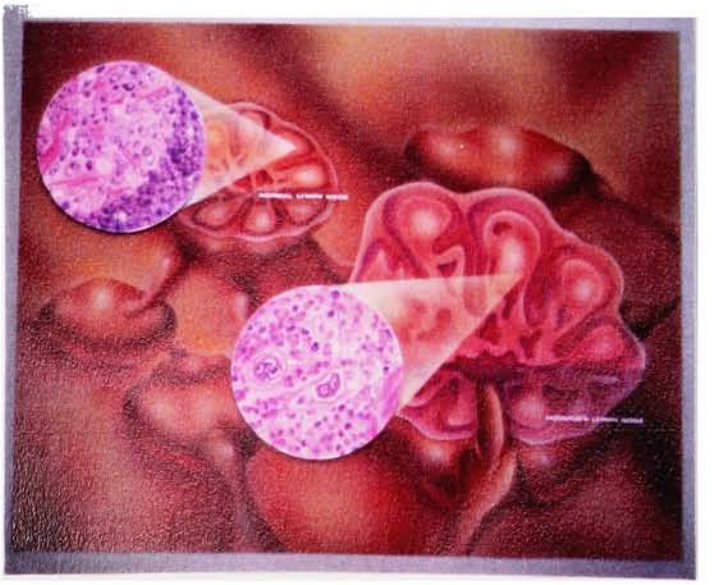
The painting was given a few days to complete its drying. The next phase of the painting would be the most tedious. I wanted to make certain the anatomy was correct and posted xeroxed reference copies around the working area. Sitting down, I began the concentrated work of muscle

formation, striation and ligament separation and organ orientation. This is the first time in the painting that I did not work all of the painting at one time. A fast drying medium of rectified turpentine, damar varnish and linseed oil with 10 to 12 drops of dryer was mixed with the paint. It was important to get the blending done as quickly as possible. I then used the rainbow of colors displayed on my pallet. I made careful notes in the dissection of the cadaver to approximate the color of tissue and organ with colored pencil. This aided tremendously in finalizing the colors in the painting. Muscle retained its raw sienna freshness while artery, vein and lymph node structures took on a dead, light yellow ochre finish.

The final touch ups now had to be installed. I glazed the artery, vein and lymph node with their appropriate anatomical colors, cadmium red medium, ultramarine blue, and viridian. The Hodgkin's sites were lightly ghosted in and the multilobed nodes given a purple, fish flesh aura. I was taught an interesting technique by an illustrator of our time, Boris Vallejo. In order to create the illusion of color under skin, you paint the desired color, allow drying time then blend skin tone color over the area of proliferation. If the skin tone is thin enough, a translucent image is created and we see the organ through the skin. I tested this technique in the lymph node tubules of the head and was pleased with the results. Creating highlights with titanium white and the base color of each area, I "punched up" the luster of the painting. These little "gleemies" added greater vitality to the work giving it a wet, fresh look.

All that was left now was to coat the piece with a protective polish. I used damar varnish after the painting had dried for a week or so. With one coat, the painting took on a distinct abeyance. Now, when the light catches the surface of the painting it glazes back at the viewer.

Normal lymph node vs. Hodgkin's lymph node
Airbrush / Mixed media
16" x 20"
Airbrush is a medium that I feared. I had limited experience with it and therefore felt a



bit uncomfortable using it. The conceptualized piece could be done in no other medium so I mastered fear and began the construction of this the second work for the thesis show.

In my plans to relay information to the viewer, I wanted to design a working description of the normal lymph node and its histology versus the Hodgkin's lymph node and its histology. This way the viewer could actually see the morphology and clearly connect the relationship. What needed to be in this piece were two lymph nodes, one normal and a Hodgkin's affected node. I was flying to Missoula, Montana during Christmas break when the idea finally solidified.

I contacted my father who sent me a histological slide of the Reed-Sternberg cell in the cortex of the lymph node. Dr. Merrill, my associate adviser, provided me with three histologic slides of normal lymph node structure. With water color, I matched the violet, pink H and E stains of the slides and created two circular discs demonstrating the histological make up of both the normal and the Hodgkin's lymph nodes.

The airbrush background that the two disks were to be mounted on took much longer. As with every piece of art work, this too started with a sketch. The lymph nodes were placed in a simulated back ground. Each node had afferent and efferent connecting tubules organizing the negative space. Two nodes were given adequate space for the examination of the node's interior. Cone shapes extended from these two nodes to house the magnified histological examples.

I had decided to use stone-ground sienna crescent paper as my base. This was hot-pressed on to cold-press illustration board for support.

The delicate work of frisketting off the nodes took the majority of the time. Frisket film was then removed to reveal the unpainted back ground. Due to wise counseling, I took careful note as to the colors I mixed and the order in which I mixed them. With watercolor you must work backwards from other forms of painting. It helped me to write each step down so confusion didn't stifle the next succeeding step.

I used a badger 150, the airbrush recommended, durable, dependable and reasonably priced. In any airbrush piece you must build the foundation of the painting with layers of color. This is important in looking at the depth of your shadows. After few passes with the brush, a serene

landscape of sienna orange developed on the paper. Umbers pushed the shadows back giving the three dimensional shape of a lymphatic environment.

Each node was handled similar to that of a sphere, core shadow, reflected light and a highlight. For the most part, this stage of the work was awkwardly easy. It was too good to be true. I spent the next few nights, painstakingly, hand-painting the intercellular structure of the two nodes. Content with this look, I finished with a cast shadow on the surface of the nodes. However, when the frisket film came off, to my horror, the shadow was almost black: Serious frustration!

Mistakes with an airbrush can be the most difficult to correct. This panel had close to 30 hours already into it, yet there was no way of saving it without the needed corrections. I masked the whole area off and started from square one. Painting the entire inner area of the node with Chinese white, I slowly began the cycle of masking off the work, painting, masking and painting. Nine hours later and at two in the morning I had corrected the mistake.

In medical illustration we use a process called pastel dusting. This process is similar to carbon dusting in that the pastels are ground down to dust on sand paper and applied to the work with the aid of a red sable flat brush. It was this technique that gave this node piece the final punch in clarity. I was able to work without the bulk of an airbrush to tighten up the shadows and lighten the highlights making full use of the edge hardness.

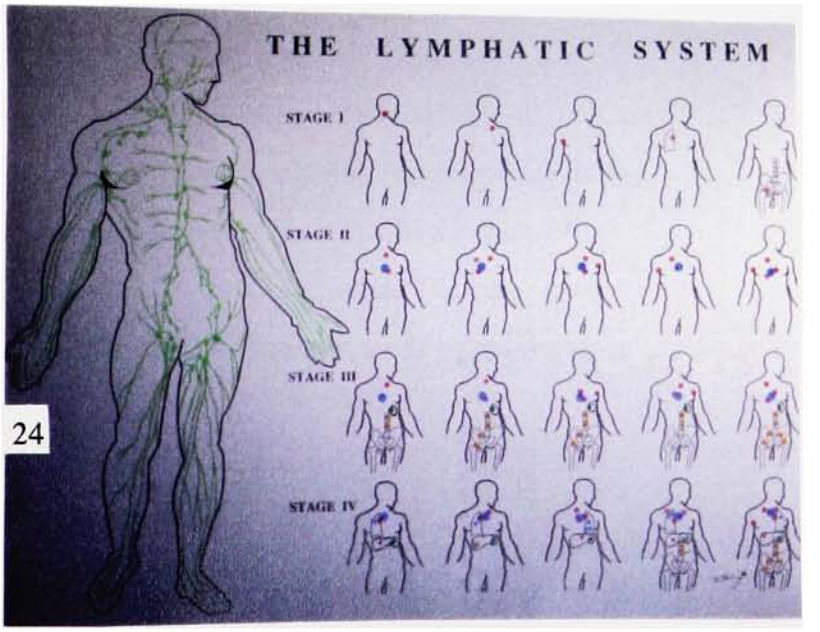
The two histology discs were mounted in their designated positions and raised on illustration board for a cast-shadow effect. This panel was now ready for critique.

Staging

Adobe Illustrator / Airbrush

19" x 20"

Over the past two years the computer had become a good friend of mine. I felt it



only appropriate to include the practical use of the computer in my thesis work. At this point of the show, I wanted to teach the viewer about his or her own immunity system, the lymphatic system. This also was a good place to inject the stages used by the physician to determine the patient's Hodgkin's development. I combined the two into one illustration.

With the assistance of the Macintosh scanner, the image of "Lymphnoid Man" was transferred from the pages of my sketchbook and placed into an Adobe Illustrator file as a template. This template was brought up and traced with the use of the pen tool. Once in the program I could maneuver the illustration, change its size and repeat it all with the stroke of the keys.

For the large lined figure, I blew the computer generated illustration up 300 times and laser printed it out. For the smaller images, I repeated them five times across and four times down. This was to simply show the staging of Hodgkin's disease. There are many number of possible Hodgkin's sites, I only selected a few to represent. In designated areas, I placed lungs, pelvic skeletal systems, and organs. All these shapes had the same genesis, they were sketched, scanned with the Apple scanner and auto-traced, then manipulated to their proper orientation. Then the computer images were laser printed out in sets. Type was injected and printed copies were made off the fonts in the Mac hard drive.

The collection of print outs was assembled onto a large print sheet. Due to its size, a professional business had to be sought to reproduce the work. The print sheet was taken to Monroe Reprographics and transferred through a copy machine to the stone-ground sienna paper. The paper was hot-pressed onto cold-press illustration board.

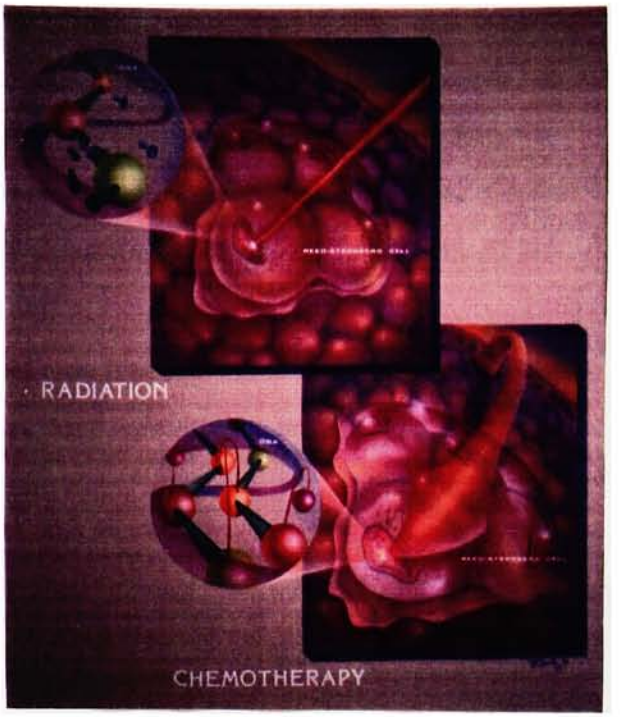
A lymph node chain system was put together from text research to show basic lymphatic construction throughout the body. This was applied to the panel by red sable with acrylic veridian, cadmium yellow light, and titanium white. Small dots were used to show Hodgkin's sites in the four stages of Hodgkin's disease. I used a template of assorted circles to make the dots. The template was held against the mounted board as I passed the air brush across. The color passed over the masked off dot leaving the shape on the board. I used a separate set of colors for each

stage of the disease. As the disease progressed, so did the colors leaving the viewer to make the correlation of the progressive nature of Hodgkin's disease.

Treatment

Airbrush / Mixed media

18 3/4" x 24"



In the thesis handbook it states " This thesis should break new ground (in the context of your work)." This is my ground-breaking piece, my favorite and most challenging. I went through pages and pages of preliminary sketches to develop a conceptual work that would express to the viewer the processes of chemotherapy and radiation therapy.

Once happy with the basic concept, the research had to intensify to clarify the accuracy of the project. This research included several visits to the radiation and chemotherapy labs at Highland Hospital where I was allowed to view and sketch the processes of radiation and chemotherapy. A radiation therapist conducted me through several labs and radiation therapy simulators. I was shown the blocking system used for organ isolation and given the latest information on modern advances in this field. A chemotherapy therapist showed me the chemotherapy solution and the varieties used. I was then allowed to watch the administration thereof. I spoke with several patients who had experienced these treatments first hand and asked them to describe the feeling for me.

I settled on a ecliptic aerial view of the Reed-Sternberg cell being struck by the laser-like radiation and the same cell over-shadowed by an arrow of chemotherapy. The back ground was to have a cellular appearance within the lymph node environment. Off from the point of radiation and

chemotherapy contact would ascend a cone-shaped window showing the biochemical reaction to the treatment. This required even more study and I found the answers I needed at the University of Rochester Medical Library.

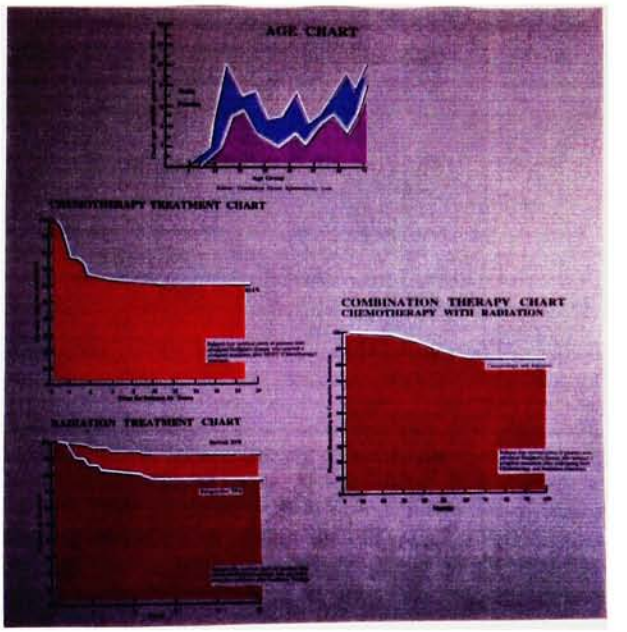
I was excited about this panel and attacked it with a vengeance, yet due to my ignorance of the media, 12 to 14 hours worth of work had to be discarded and accounted for in experience. Professor Hintz counseled me to take each trouble area and spend the time to make small test samples, thereby smoothing out the rough spots. This was a tremendous asset and resulted in a much more successful piece.

One striking difference with this panel was the bold use of vibrant colors. This was a departure from the earthy tones set in the first three panels and spilled over into the next panel.

Recovery Graphs

Mixed Media

19"x 19"



This was a basic graph chart. It was to show the viewer, with the use of graphs, the success rate treatments have had on patients over the years. The problem was the topic, graphs. For the majority of the time, graphs are basically boring. The challenge was to kick some life into an old dog. Professor Wabnitz dug out old graphs done years ago that showed the use of color aid on a black surface. This impressed me.

The graphs themselves were created in the Macintosh program Adobe Illustrator, transfered onto print paper and copied on to the same crescent paper used in the previous panels. This paper was then mounted to foam core.

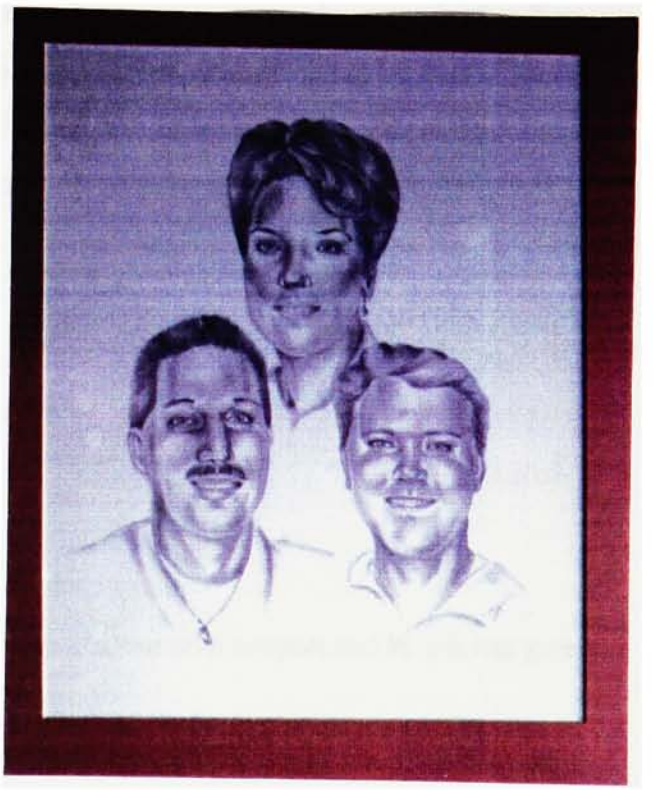
I consented to use the idea of the color aid. The plotted lines were laid out with a 1.20 #4

Rapidiograph in white with a .25 black balance line underneath. Beneath was added the color aid. I had just finished a class on color theory and was able to select colors harmonious with one another. The result was a bright set of graphs that conveyed the spirit of hope and recovery.

Patient Portraits

Carbon Dust

10"x 12"



The thesis in its genesis was to end with the graphs. In life we meet many people who change and alter us. In the research for this thesis I met three people who cast a great change over me. These three were Hodgkin's patients Lita Clayton, Timothy Cole and Joe Tomasso. Within these three individuals burned a fire for life I have never seen before. They have been to "death's door" and back with a lust for life like that of a youth. Each has a story to tell, each has a lesson learned. All have been through the storm.

Dr. Qazi is an Oncologist who sacrificed his time to assist me on occasion with information and insight. He works primarily with Hodgkin's patients and claims he can smell Hodgkin's disease a mile away. I enjoyed his kind sense of humor and his no-nonsense frankness. It was during one of my visits to his office that he held up a picture of Joe Tomasso and his family and said, in his mild Indian accent , "It's a pity you can't use a photograph such as this to end your show." I agreed that a photograph might not be conducive to the illustrated work but the wheels began to

turn.

Professor Wabnitz introduced me to carbon dusting as a medium used in surgery and other medically related fields. This technique is one of grinding carbon to dust on sandpaper and using small red sable brushes to apply the carbon on to paper. The most successful paper, I've found has been, ivory white color aid. I took this medium and applied it to portraits with some success. It was some time after my discussion with Dr.Qazi that the thought of a carbon dust portrait developed.

I contacted Lita, Timmy and Joe and with their consent, I arranged a triangular portrait of carbon dust. This portrait was taken from a series of polorids so some adaptation had to be made. The result was a black and white illustration of three individuals who over came the odds and now live normal, healthy, happy, productive lives. Underneath their portraits are quotes from each which bare repeating:

"No matter how long the road to recovery seems, or how many detours you must take, always remember that you will get there with positive results."

Joe Tomasso

"This has been a challenge I never expected to meet in life, but with support and help it has given me a different outlook on life."

Lita Clayton

"I've been given the key to the true meaning of life due to the battle against Hodgkin's disease."

Timothy Cole

"I would throw-up 50 or 60 times in the course of four or five hours. The Doctors know that. They prescribe liquids and soft foods. It's ironic in a way but the things that are the worst going down are usually the best coming back up. To this day I can't eat jello or drink ginger ale. Just the sound of the words nausea or bloating make me sickly. And the smell. I don't know what it is but chemo had this *smell* . If I smell that odor I just want to get the Hell out," Timmy motions his escape. He continues in his description, "I see chemo as this force of dark, good guys, that just invaded (the body) with no mercy as to who or what they kill. Just their overwhelming power of destruction rapes the body of everything. The only way I could equate it to you is the reference of a woman's monthly period. They feel really dirty inside, they can't get themselves clean. It has also been described to me as the feeling of a woman after she's been raped or gone through the uncomfortable ordeal of having an abortion. No matter how many showers you take, the chemo drugs make you feel so dirty."

As part of my research for my thesis, I felt it necessary to talk with a source other than the highly trained physician. I wanted to understand the *people's* side of the story, the word from the street. I contacted the Hodgkin's support group fully aware that the patients may not want to rehash old memories. To my surprise, I was contacted by a group of Hodgkin's patients not only willing but eager to share their experience. I placed a recorder in the center of the discussion. Lita Clayton takes the story from there, "We have permanent tattoos where they marked off our body to orient the radiated area for radiation therapy. My radiation covered both my mediastinal and pelvic area. Afterwards, it was like having the worst sunburn ever. I couldn't believe how painful it was." Tim joins in, "I felt like a burger, they shoot you for a minute on one side then flip you over on the other side."

The group continued to discuss the traumatic effects of the treatment, weight loss for the men, weight gain for the women. All were adamant as to the shock of losing all body hair. Some thought they could handle this side effect of chemotherapy, but all agreed it was the very worst of the outward appearance changes. "The treatments got to be so discomforting toward the end that I

had to be forced to go, and almost carried into the rooms," stated one patient.

A somber Lita reflects,"Things that helped me through were family, friends and state-of-mind. Her eyes glisten, " My family was the best, especially my youngest son. When he would get money for Christmas or his birthday he would say, here mom, this money is for your medicine."

"I notice the little things, the birds, the flowers, the change of the seasons, much more so now, relates Mr. Cole. A smile touches his lips, "I don't get as angry waiting for the traffic, I have more patience when I'm in line at the grocery store. This whole war thing right now seems all so stupid. I wish for one day those leaders could feel the effects of fighting this disease. Maybe their minds would be turned to humanity and not the senseless slaughter of thousands."

I caught myself being a bit more patient with the traffic as I drove home that night. My own thoughts reflected back through the length of the discussion. As a spectator I was allowed into a world of educated philosophers. A group of people given a new breath of life. How humble and insignificant I was in my understanding of such a large awakening. I almost wanted to know the knowledge and gain the understanding.

For now, these patients are in the waiting stages of the cause and effect results of treatment. It has only been eight to ten months since the last treatment for some. Remission, clinically, won't begin until two years after the last treatment. For these patients, remission begins as soon as you believe in your own cure. They were positive in their results and confident of the success over their disease.

I got a call from Lita the night before my show opened, cat scans found a recurring spot on her liver.

LIBERTIES OF LIFE

Eight months have passed since I committed myself to the conceptual look at Hodgkin's disease. My art, my life and my soul have been altered because of it. In this relatively short time, I, with the aid of my committee, have organized a presentation of essential Hodgkin's disease

information. The presentation included panels of the disease and its location, the lymphatic or immune system, the lymph node, its Hodgkin's morbidity and their respective morphology. Panels demonstrating Hodgkin's stages, known treatments and their measured success were also included as presented essentials. Finally, closing with the human side viewed through the eyes of the afflicted. The thesis panels and aided information plates shed the added insight to an audience for better understanding. The origin of Hodgkin's disease remains to be debated, yet the treatments are sound and usually successful.

The human body is a complex machine full of complex systems. The immunity system is still a system requiring greater study by myself to fully understand. However I have a learned confidence of its relationships to its host. I am grateful for the opportunity to have studied this system in the detail needed. It was one among several systems within the body that confused my biological understanding. No longer do its complexities mystify. The order is now somewhat in place and I can begin to use the knowledge and learned processes to continue on in greater enlightenment that this life affords.

The art work stands as a culmination of influences and supplemental skills. I forced myself to fathom the awkward newness of techniques; to overcome the apprehensiveness associated with a new medium. I can honestly say I reached a higher ground while broadening much-needed skills. Much of the credit lies with the patient guidance offered by professors, educators and professionals alike.

The greatest insight, the one I am most thankful for is that relation to God's afflicted. It was through them that my own eyes saw more than pictures and words. My values were reassessed to incorporate those lofty goals and intentions of the meek. I hold this most dear and hope that it never fades.

As the world of science races forward to infinity, I would hope to someday see a state of Utopia, where we live a life free from disease and the monstrosity of man, his environment and polluted culture. A life where the children grow old, the young at heart retain the riches of life's experiences. The need for pain abolished and the soul set free to wander skies of endless blue. Such traits are reserved for heaven.

Maybe God in his infinite wisdom knew the frailties of man. Knew his haughty, self-centered, arrogance. Knew a life of bliss would only bring about man's destruction. So he allows us the pain, not for the afflicted but, for the general man. By this we teach, educate and care. We learn to love the hated, care for the needy and challenge the inner-self for greater potential. All is not lost in pain, death or sorrow. All is merely added upon.

I glanced over at the rosary cascading from our decorative dresser mirror. It ornamented the serpentine cherry-wood and its color played against the moonlight. The night was hot, too hot to sleep. Thoughts were heavy. My eyes closed, sweat beaded across their lids and my mind rose in prayer to the one whose wisdom allows all man the privilege. The privilege of knowing life as the experience, the journey, the soul's moment of identity. For all we are, all we carry with us is the preservation of mankind.

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